

**I claim:**

1. A chemical composition comprising:
  - a) a first surface-active agent having an HLB in a range of about 5 to about 9;
  - b) a second surface-active agent having an HLB in a range of about 11 to about 13;
  - c) a third surface-active agent having an HLB in a range of about 14 to about 33;
  - d) a coupling agent; and
  - e) a coalescing solvent.
2. The composition of claim 1 wherein the first surface agent, second surface agent and third surface agent are comprised of nonionic ethoxylated alcohols.
3. The composition of claim 2 wherein the first surface agent is an alkoxyated aliphatic alcohol.
4. The composition of claim 2 wherein the second surface agent is a branched alcohol EO/PO block copolymer.
5. The composition of claim 2 where the third surface agent is a polyoxyethylene (9) decyl ether.
6. The composition of claim 1 wherein the coupling agent is a C<sub>21</sub> dicarboxylic fatty acid.
7. The composition of claim 1 wherein the coalescing solvent is selected from the group consisting of water, short chain alcohols, glycols and glycol ethers.

8. The composition of claim 1 wherein the composition is added to a treatment fluid to enhance the wetting and cleaning characteristics of the fluid.
9. The composition of claim 8 wherein the treatment fluid is selected from the group consisting acids, bases, distillate oils, aromatic solvents, liquefied gases, alcohols, glycols, and glycol ethers.
10. The composition of claim 8 wherein the additive is combined with the treatment fluid in an amount ranging from 0.75 to about 1.5 ounces of additive per gallon of treatment fluid.
11. The composition of claim 1 wherein the first surface-active agent is present in an amount ranging from about 0.8 to about 10% by weight.
12. The composition of claim 1 wherein the second surface-active agent is present in an amount ranging from about 5.9 to about 70% by weight.
13. The composition of claim 1 wherein the third surface-active agent is present in an amount ranging from about 6.3 to about 70% by weight.
14. The composition of claim 1 wherein the coupling agent is present in an amount ranging from about 4 to about 15% by weight.
15. The composition of claim 1 wherein the coalescing solvent is present in an amount ranging from about 1 to about 10% by weight.
16. A chemical additive for use in combination with a treatment fluid for removing precipitated material from an oil well including, asphaltenes and paraffins, deposited on casing and related equipment of the oil well and adjacent formations through which crude oil and co-produced water enters the well comprising:

- a) a first surface-active agent having an HLB in a range of about 5 to about 9;
- b) a second surface-active agent having an HLB in a range of about 11 to about 13;
- c) a third surface-active agent having an HLB in a range of about 14 to about 33;
- d) a coupling agent; and
- e) a coalescing solvent.

17. The composition of claim 16 wherein the first surface agent, second surface agent and third surface agent are comprised of nonionic ethoxylated alcohols.

18. The composition of claim 17 wherein the first surface agent is a alkoxylated aliphatic alcohol.

19. The composition of claim 17 wherein the second surface agent is a branched alcohol EO/PO block copolymer.

20. The composition of claim 17 where the third surface agent is polyoxyethylene (9) decyl ether.

21. The composition of claim 16 wherein the coupling agent is a C<sub>21</sub> dicarboxylic fatty acid.

22. The composition of claim 16 wherein the coalescing solvent is selected from the group consisting of water, alcohols, glycols and glycol ethers.

23. The composition of claim 16 wherein the composition is added to a treatment fluid to enhance the wetting and cleaning characteristics of the fluid.

24. The composition of claim 23 wherein the treatment fluid is selected from the group consisting acids, bases, distillate oils, aromatic solvents, liquefied gases, water, alcohols, glycols and glycol ethers.
25. The composition of claim 23 wherein the additive is combined with the cleaner in an amount ranging from 0.75 to about 1.5 ounces of additive per gallon of treatment fluid.
26. The composition of claim 16 wherein the first surface-active agent is present in an amount ranging from about 0.8 to about 10% by weight.
27. The composition of claim 16 wherein the second surface-active agent is present in an amount ranging from about 5.9 to about 70% by weight.
28. The composition of claim 16 wherein the third surface-active agent is present in an amount ranging from about 6.3 to about 70% by weight.
29. The composition of claim 16 wherein the coupling agent is present in an amount ranging from about 4 to about 15% by weight.
30. The composition of claim 16 wherein the coalescing solvent is present in an amount ranging from about 0.8 to about 10% by weight.
31. A chemical additive for use in combination with a treatment fluid for removing precipitated materials from an oil well including, asphaltenes and paraffins deposited on well casings and associated equipment and adjacent well formations through which crude oil and co-produced water enters the well comprising:
- a) an alkoxyated aliphatic alcohol present in an amount ranging from about 0 to about 70% by weight;

- b) a branched alcohol EO/PO block copolymer present in an amount ranging from about 0 to about 70% by weight;
- c) a polyoxyethylene (9) decyl ether a ranging from about 0 to about 10% by weight;
- d) a coupling agent; and
- e) a coalescing solvent.

32. The composition of claim 31 wherein said coupling agent is a C<sub>21</sub> dicarboxylic fatty acid.

33. The composition of claim 31 wherein said coalescing solvent is selected from the group consisting water, alcohols, glycols, and glycol ethers.

34. The composition of claim 31 wherein the treatment fluid is selected from the group consisting acids, bases, distillate oils, aromatic solvents, liquefied gases, water, alcohols, glycols and glycol ethers.

35. The composition of claim 34 wherein the additive is combined with the treatment fluid in an amount ranging from about 0.75 to about 1.5 ounces of additive per gallon of treatment fluid.

36. A method of removing contaminants from an oil well including, asphaltenes and/or paraffins precipitated on oil well casing and associated equipment and/or adjacent formations through which crude oil and co-produced water enters the well, the steps of the method comprising:

- a) providing a treatment fluid including one or more of a group including: acids; bases; distillate oils; aromatic solvents, liquefied gases; alcohols; glycols, glycol ethers; and fresh and saline waters.
- b) introducing a first quantity of the treatment fluid into the well; and

- c) providing an additive having the following chemical characteristics:
- i) a first surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 5-9;
  - ii) a second surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 11-13;
  - iii) a third surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 14-33;
  - iv) a coupling agent comprising a dicarboxylic fatty acid; and
  - v) a coalescing agent comprising one or more of a group including de-ionized water, alcohols, glycols, and glycol ethers; and
- d) introducing a second quantity of the additive into the well, the additive being injected before, during, and/or after introduction of the first quantity of the treatment fluid.

37. The method of cleaning of impurities from an oil well as set forth in claim 36 wherein a volume ratio of the first quantity of treatment fluid to the second quantity of additive is within a range of 128 :1 to 128 :10.

38. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein a portion of the second quantity of the additive is introduced into the well casing prior to the introduction of the first quantity of the treatment fluid and a remaining portion of the second quantity of the second quantity of the

additive is introduced during introduction of the first quantity of the treatment fluid.

39. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein at least a portion of the second quantity of the additive is introduced into the well concurrently with the introduction of the first quantity of the treatment fluid into the well.

40. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein at least a portion of the second quantity of the additive is premixed into at least a portion of the first quantity of the treatment fluid prior to introducing the first quantity of the treatment fluid into the well.

41. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein after introduction of the first quantity of the treatment fluid and the second quantity of the additive, the well is shut in and maintained in a shut in condition for a predetermined period established by well condition and/or treatment objectives.

42. The method of cleaning of contaminants from an oil well as set forth in claim 41 wherein after the predetermined period has elapsed the well is opened and the introduced materials are withdrawn along with contaminants solubilized, dispersed, or suspended in the injected fluids, crude oil and co-produced water.

43. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein the first surfactant of the additive comprises an alkoxylated aliphatic alcohol or a linear alcohol.

44. The method of cleaning of contaminants from an oil well as set forth in claim 43 wherein the first surfactant of the additive has a weight percentage in a range of about 0.8 to about 10%.

45. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein the second surfactant of the additive comprises a branched alcohol EO/PO primary alcohol alkoxylate.

46. The method of cleaning of contaminants from an oil well as set forth in claim 45 wherein the second surfactant of the additive has a weight percentage in a range of about 5.9 to about 70%.

47. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein the third surfactant of the additive comprises alkoxylate polyoxyethylene (9) decyl ether.



48. The method of cleaning of contaminants from an oil well as set forth in claim 46 wherein the third surfactant of the additive has a weight percentage in a range of about 6.3 to about 70%.

49. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein the coupling agent of the additive comprises a C<sub>21</sub> dicarboxylic fatty acid.

50. The method of cleaning of contaminants from an oil well as set forth in claim 49 wherein the coupling agent of the additive has a weight percentage in a range of about 4 to about 15%.

51. The method of cleaning of contaminants from an oil well as set forth in claim 36 wherein the coalescing agent of the additive has a weight percentage in a range of about 0.8 to about 15%.

52. In a method of cleaning of contaminants from an oil well including, asphaltenes and paraffins deposited on well casing and/or adjacent formations through which crude oil and co-produced water enters the well of the type where a first quantity of treatment fluid is injected into the well, the treatment fluid including one or more of a group including: acids; bases; distillate oils; aromatic solvents; liquefied gases; alcohols; glycols; glycol ethers; fresh water and saline waters, the improvement comprising:

- a) providing an additive having the following chemical characteristics:
- i) a first surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 5-9;
  - ii) a second surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 11-13;
  - iii) a third surfactant comprising a nonionic ethoxylated alcohol having an HLB in a range of 14-33;
  - iv) a coupling agent comprising a dicarboxylic fatty acid; and
  - v) a coalescing agent comprising one or more of a group including de-ionized water, alcohol and glycol ether; and
- b) injecting a second quantity of the additive into the well, the additive being injected before, during or after injection of the first quantity of the treatment fluid.

53. The improved method of removing contaminants from an oil well as set forth in claim 52 wherein a volume ratio of the first quantity of treatment fluid to the second quantity of additive is within a range of 128 :1 to 128 :10.

54. The improved method of removing contaminants from an oil well as set forth in claim 52 wherein a portion of the second quantity of the additive is injected into the well prior to injection of the first quantity of the treatment fluid and a remaining portion of the second quantity of the additive is injected during injection of the first quantity of the treatment fluid.

55. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein at least a portion of the second quantity of the additive is injected into the well concurrently with the injection of the first quantity of the treatment fluid into the well.

56. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein at least a portion of the second quantity of the additive is premixed into at least a portion of the first quantity of the treatment fluid prior to injecting the first quantity of the treatment fluid into the well.

57. The improved method of removing contaminants from an oil well as set forth in claim 52 wherein after injection of the first quantity of the treatment fluid and the second quantity of the additive, the well is shut in and maintained in a shut in condition for a predetermined period of time based on the well conditions and treatment objectives.

58. The improved method of cleaning of contaminants from an oil well as set forth in claim 57 wherein after the predetermined shut in period has elapsed the well is opened and the injected materials are withdrawn along with contaminants solubilized, dispersed, or suspended in the injected materials, produced crude oil and co-produced water.

59. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein the first surfactant of the additive comprises an alkoxyated aliphatic alcohol or a linear alcohol alkoxylate.

60. The improved method of cleaning of contaminants from an oil well as set forth in claim 59 wherein the first surfactant of the additive has a weight percentage in a range of 1% - 10%.

61. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein the second surfactant of the additive comprises a branched alcohol EO/PO block copolymer.

62. The improved method of cleaning of contaminants from an oil well as set forth in claim 61 wherein the second surfactant of the additive has a weight percentage in a range of 30% - 40%.

63. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein the third surfactant of the additive comprises polyoxyethylene (9) decyl ether.

64. The improved method of removing contaminants from an oil well as set forth in claim 63 wherein the third surfactant of the additive has a weight percentage in a range of 40% - 50%.

65. The improved method of cleaning of contaminants from an oil well as set forth in claim 52 wherein the first coupling agent of the additive comprises a C<sub>21</sub> dicarboxylic fatty acid.

66. The improved method of cleaning of contaminants from an oil well as set forth in claim 65 wherein the coupling agent of the additive has a weight percentage in a range of 1% - 15%.

67. The improved method of removing contaminants from an oil well as set forth in claim 52 wherein the coalescing agent of the additive has a weight percentage in a range of 1% - 15%.

68. A chemical additive for use in combination with a treatment fluid for capturing and subsequently releasing crude oil built-up on a casing of an oil well and/or associated equipment of the oil well and/or adjacent formations, the additive comprising:

- a) a first nonionic surface-active agent;
- b) a second nonionic surface-active agent;
- c) a third nonionic surface-active agent;
- d) a coupling agent;
- e) a coalescing solvent,

wherein the additive, in combination with water in the adjacent formations, operates to create a condition wherein the water partially solublizes and weakly emulsifies crude oil constituents, which are commingled with the water and/or on a surface of the adjacent formations during injection of the treatment fluid and subsequently releases the partially solublized and emulsified crude oil constituents during a shut-in period.

69. A chemical additive for use in combination with a treatment fluid as set forth in claim 68 wherein the surface of the adjacent formations is returned to a more water wet condition than would have been attained in using the treatment fluid alone.